SPATIAL RELATIONSHIPS BETWEEN AIR POLLUTION AND TRAFFIC NOISE FROM ROAD AND RAIL IN OSLO, NORWAY

Bente Oftedal, *Norwegian Institute of Public Health, Norway*
Gunn Marit Aasvang, *Norwegian Institute of Public Health, Norway*
Christian Madsen, *Norwegian Institute of Public Health, Norway*
Per E. Schwarze, *Norwegian Institute of Public Health, Norway*
Sam-Erik Walker, *Norwegian Institute for Air Research, Norway*
Erik Aune, *Municipality of Oslo, Norway*
Per Nafstad, *Institute of General Practice and Community Medicine, University of Oslo, Norway*

Background and Aims: Epidemiological studies have reported associations between cardiovascular outcomes and traffic-related air pollution and noise, but correlation between these pollutants may lead to mutual confounding of associations. We evaluated the spatial relationships between residential air pollution and noise at most and least noise exposed façade, separately for road and rail traffic noise.
Methods: Addresses of the participants in "The Oslo Health Study" (HUBRO) were assigned residential road traffic noise (N=13 764), rail noise (N=3 475) and nitrogen dioxide (NO_2) levels. The noise indicators L_{den} (A-weighted day-evening-night noise level) and L_{night} were calculated using the Nordic Prediction Method for Road and Railway Noise, on 5 x 5 m^2 grid. NO_2 was calculated by the EPISODE dispersion model on 1 km^2 grid and at receptor points representing a higher exposed subpopulation (N=2 599 for road traffic and N=901 for railway noise).
Results: All pollutants have large spatial variation. The correlation between road traffic noise and NO_2 was 0.4 at most exposed and 0.1 at least exposed façade, with similar correlations in the higher exposed subpopulation. In the rail noise population, these correlations were 0.5 and 0.0, respectively, and 0.2 between rail noise and NO_2. The rail noise levels were on average 9 dB(A) lower than the road noise levels.
Conclusions: The moderate correlation between road traffic noise at the most exposed façade and NO_2 suggests a potential to separate their cardiovascular effects. Despite the weak correlation between rail noise and NO_2, road traffic noise dominates this population, and rail noise may not contribute additionally to disentangle effects of traffic-related air pollution and noise in our urban population. The negligible correlations at the least noise exposed façade, which is often the bedroom's façade, may aid in separating effects of night-time noise from air pollution.